CLAIMS

1. An acoustooptic filter comprising:

an acoustooptic substrate having an optical waveguide disposed at a principal surface;

an interdigital electrode disposed on the acoustooptic substrate and exciting a surface acoustic wave for converting a mode of light guided in the optical waveguide, a surface wave waveguide for the surface wave excited by the interdigital electrode extending in substantially the same direction as the optical waveguide, the mode of the light guided to the optical waveguide being converted by the surface acoustic wave; and

phase match condition changing means for changing a phase match condition at a mutual action area by 0.235% or more from a state in which phases are matched, the mutual action area being an area where the surface acoustic wave and the light guided to the optical waveguide act upon each other.

2. The acoustooptic filter according to Claim 1, wherein the phase match condition changing means is means for changing the phase speed of the surface acoustic wave at the mutual action area.

3. The acoustooptic filter according to Claim 2, wherein the phase match condition changing means is means for changing the phase speed of the surface acoustic wave at the surface wave waveguide.

4. The acoustooptic filter according to Claim 3, wherein the means for changing the phase speed of the surface acoustic wave at the surface wave waveguide is a thin-film ridge disposed at the surface wave waveguide.

5. The acoustooptic filter according to Claim 4, wherein the thickness of the thin-film ridge changes along the surface wave waveguide, so that the phase speed of the surface acoustic wave is changed at the surface wave waveguide.

6. The acoustooptic filter according to Claim 3, wherein the means for changing the phase speed of the surface wave at the surface wave waveguide has a structure in which the width of the surface wave waveguide changes in the direction of extension of the surface wave waveguide.

7. The acoustooptic filter according to Claim 3, wherein a pair of wall surfaces for reflecting the surface wave are disposed, one at each side of the surface wave waveguide, and the phase speed at the surface wave waveguide is changed by the pair of wall surfaces.

8. The acoustooptic filter according to Claim 7, wherein structures of wall members having the respective wall surfaces change along the surface wave waveguide, so that the phase speed of the surface acoustic wave is changed.

9. The acoustooptic filter according to Claim 7, wherein the distance between the pair of wall surfaces changes, so that the width of the surface wave waveguide changes.

10. The acoustooptic filter according to Claim 2, wherein the phase match condition changing means is a phase speed control film for changing the phase speed of the surface acoustic wave at the mutual action area.

11. The acoustooptic filter according to Claim 10, wherein the thickness of the phase speed control film is selected so that the phase match condition changes by 0.235% or more.

12. The acoustooptic filter according to Claim 1, wherein the phase match condition changing means is means for changing a propagation coefficient of the surface acoustic wave or an effective refractive index of the light at the mutual action area.

13. The acoustooptic filter according to Claim 12, wherein the means for changing a propagation coefficient of the surface acoustic wave or an effective refractive index of the light is means for setting a temperature distribution of the mutual action area.

14. The acoustooptic filter according to Claim 13, wherein the temperature distribution setting means is a heating element disposed on the acoustooptic substrate.

15. The acoustooptic filter according to Claim 14, wherein the heating element is a heater.

16. The acoustooptic filter according to Claim 14, wherein the interdigital electrode is the heating element.

17. The acoustooptic filter according to Claim 13, wherein the temperature distribution setting means is formed of a thin film disposed on the surface wave waveguide, and the thickness of the thin film partly differs so as to possess the temperature distribution.

18. The acoustooptic filter according to Claim 12, wherein the means for changing a propagation coefficient of the surface wave or an effective refractive index of the light at the mutual action area is disposed at the optical waveguide.

19. The acoustooptic filter according to Claim 18, wherein the means for changing a propagation coefficient or an effective refractive index of the light is the optical waveguide having a width which is set so as to change the phase match condition by 0.235% or more.

20. The acoustooptic filter according to Claim 18, wherein the means for changing a propagation coefficient or an effective refractive index of the

light, which is disposed at the optical waveguide, is formed of metal diffused at the optical waveguide.